HumRRO

U.S. Army Leadership Human Research Unit
Presidio of Monterey, California

Under the Technical Supervision of

The George Washington University
HUMAN RESOURCES RESEARCH OFFICE
operating under contract with
THE DEPARTMENT OF THE ARMY

Task ENDORSE
Research Memorandum

REPORTED VISUAL SENSATION DURING BRIEF EXPOSURE TO REDUCED SENSORY INPUT

Thomas I. Myers & Donald B. Murphy

Approved:

Howard H. McFann
Director of Research

Capt. Henry L. Klim
Acting Chief

U.S. Army Leadership Human Research Unit
Presidio of Monterey, California
January 1960

Foreword

This report comprises the verbatim text of a paper presented by the senior author at the Symposium on Hallucinations held under the joint sponsorship of the Committee on Research of the American Psychiatric Association and the American Association for the Advancement of Science in Washington, D.C., on 27 December 1958.

The Human Resources Research Office, under contract with the Department of the Army, is currently engaged in research on sensory deprivation in Monterey, California. Like many working in this area, we were greatly stimulated by the provocative findings of researchers such as the McGill University group.

Of the many behavioral changes noted by these researchers, the occurrence of the hallucinatory phenomena was, perhaps, the most dramatic. Therefore, it was only natural that we, too, would be most curious about such phenomena and intensely interested in discovering whether we would reproduce them under somewhat different experimental conditions.

Two years ago, and again this fall, we conducted exploratory studies under "dark cell" conditions similar to those made famous by Dr. Jack Vernon of Princeton University. A total of 15 subjects experienced this limited sensory environment, some for as long as four days. A like number of subjects served in a control condition so that test performance changes could be better evaluated. Since we used professional personnel as subjects, they were necessarily somewhat sophisticated and knew of the findings in this research area.

Insofar as the hallucinatory experiences were concerned, the net results of these studies, which involved a sizeable number of man-days, were somewhat disappointing. Reports of light and dark flashes were fairly frequent. One subject described them as similar to a "projector on the blink." However, only a few subjects experienced complex visual sensations or colorful panoramic vistas. No subject ascribed reality status to any of the visual phenomena either during the experiment or later. The images, they said, were similar to those of dreams, but were typically more saturated in hue.

Clearly, we had not obtained the hallucination of classic definition. Colorful dreams and fantasies were reported, but none of our subjects found them compellingly "real." Comparison of our observations to those of the McGill and Princeton studies is most tenuous.

Since none of our subjects reported visual experiences which seemed as gripping and disturbing as the famous marching eyeglasses scene from the McGill study, we believe that our visual experiences were, perhaps, less intense. Roughly, they seemed comparable to the findings of Vernon at Princeton.

If it is true that there are differences between studies in degree of reported visual sensations, then speculation as to reasons for this draw upon a confusing welter of variables. The condition of darkness, as opposed to diffuse brightness, may have accounted for the varying reports. To check this idea, a few of us put on frosted goggles, but again, we did not experience compelling effects.

Other differences between the studies included a host of varying conditions, such as the population sampled, the subjects' sophistication and motivation, the terms of recruitment, the conditions limiting the perceptual experience itself, and the relationship and degree of dependence upon the experimenter during the experiment.

Since we did not experience the compelling, unusually vivid experiences reported by other experimenters, we considered the possibility that idiosyncratic visual experiences may be more common than normally anticipated. In particular, we became interested in the procedures for eliciting and interpreting verbal reports of visual sensations. It may be that in twilight states preceding sleep, or in the unusual circumstances of sensory deprivation studies, visual sensations become noteworthy, even dominating, even though one normally ignores or just doesn't notice them. Certainly it is reasonable to believe that expectancies, biases, and sets on the part of the subject might predetermine the likelihood of his experiencing--or at least of his reporting--the visual events. Among such set factors one might mention the subject's willingness to cooperate in the experiment, his eagerness to conform to what he thinks is expected of him, and his expectancies regarding the deprivation experience itself--as influenced by rumor and by facts and attitudes communicated to him during his recruitment and orientation.

We decided to evaluate some of these factors. The major contribution to this work has been Dr. Donald B. Murphy, assisted by Mr. Ed Kandel and myself. The research was designed so that we could examine the influence of certain "set" variables upon the number and complexity of reported visual sensations. Specifically, the variables were prior verbalization and instructions. Also it should be pointed out that none of the studies reporting hallucinations under sensory deprivation conditions provided any comparison data as to the incidence of such experiences under normal or minimal deprivation conditions. To be sure, it is difficult in some cases even to conceive of a relevant control experience; but unless some baseline is used, we must be content with descriptive statements as to "occurrence of visual experiences," rather than to conclusions of the order, "sensory deprivation conditions produce a greater incidence of hallucinatory effects."

This methodological point generated two considerations regarding this research. First of all, we planned to place subjects under minimal deprivation conditions, so that we could get at least a crude indication of baseline frequency of visual events. Secondly, our strong bias toward experimental analysis of sensory deprivation has forced us to seek a technique which might be just as applicable to control group subjects as to experimental subjects undergoing sustained deprivation.

The first experimental variable, prior verbalization, was defined as individual practice in "seeing things" on a projective test and describing them to an experimenter. For the second variable, two sets of instructions were used. One was designed to produce a positive expectancy

of visual sensations, while the other was intended to produce negative expectancy with respect to visual events.

The research was conducted upon 80 psychiatrically normal Army basic trainees who were in their early 20's and who had above-average ACB scores. One-half of the sample, 40 men, was given a pretest, ostensibly a part of another experiment. This pretest consisted of Rorschach cards VIII, IX, and X, and the subjects were encouraged to verbalize freely about what they saw in the cards. The other half of the sample had no pretest Rorschach experience.

The Ror group and the Non-Ror group were then divided into positive or negative expectation groups. Thus, there were four groups of 80 men each. The positive instruction groups were told that it is normal to experience visual sensations in the absence of external light, and that the experimenter wished the subject to attend to and describe his visual sensations. The negative instruction groups were told that only psychiatric patients reported seeing things in the absence of external light.

Subsequently, the subject put on a pair of opaque goggles and lay on a bed in a semi-lightproofed room. After leaving him alone under these conditions for 10 minutes, the experimenter asked the subject, by means of an intercom system, several questions to assure that he was awake. The subject was then asked to describe the visual sensations he was actually experiencing. If, after one minute the subject had said nothing, the request was repeated. If the subject had been talking during the first minute, the experimenter said, "You're doing fine." If the subject was silent for four consecutive minutes, this phase of the subject's participation was concluded, otherwise he was allowed a 15-minute reporting period.

Protocols were typed from the tape recorded reports, and then keyed. A technical assistant scored the protocols by first bracketing the word groups which reported the occurrence of a visual sensation, and second by assigning one of four content categories to each bracketed area.

The content categories were chosen on the basis of other deprivation experiments and by examination of the sensations reported by our subjects. The categories can be differentiated on the basis of complexity. From least complex to most complex, they are: (1) lines, dots, and diffuse light; (2) geometrical designs; (3) isolated objects; and (4) integrated scenes.

In evaluating our results, we first considered the number of visual sensations reported and then their complexity. The total number of sensations reported for each of the four treatment combinations and the results of the statistical analyses are shown in Table 1.

More than twice as many visual sensations were reported by the positive instruction groups as by the negative instruction groups ($P < .01$).

Table 1

Number of Visual Sensations Reported
in Each Treatment-Combination

Instructions	Prior Verbalization: Non-Ror	Prior Verbalization: Ror
Pos.	N = 20 ΣX = 340 M = 17.0	N = 20 ΣX = 297 M = 14.8
Neg.	N = 20 ΣX = 162 M = 8.1	N = 20 ΣX = 146 = 7.3

Analysis of Variance

Source of Variation	df	MS	F	P
Instruction	1	1353.01	7.61	< .01
Prior Verbalization	1	43.51	--	
Instr. x Prior Verb.	1	9.12	--	
Within cells (error)	76	177.77		
Total	79			

However, prior verbalization on the Rorschach had no significant effect on the number of sensations reported.

Further examination of our data suggested that if a subject reported a Category 4 sensation, he also reported sensations in the less complex categories; i.e., Categories 3, 2, and 1. Similarly, if a subject reported visual sensations in Category 3, he also reported visual sensations in Categories 2 and 1. This observation suggested that the categories formed a Guttman-type cumulative scale having to do with the complexity of the verbal report. Analysis showed, using Guttman's technique, that the coefficient of reproducibility was .94. This level of reproducibility seemed to warrant the use of a scaling procedure in which each subject was assigned a complexity-of-report score. Consequently, we assigned "scale scores": 4 to subjects who reported sensations in all four categories; 3 to subjects who reported sensations in the first three categories; and so forth.

The scale scores for the four treatment combinations and the results of the statistical analyses are shown in Table 2.

According to statistical analysis, positive instructions were found to produce more complex reports than negative instructions ($P \leq .025$), whereas prior verbalization had no significant effect on the complexity of the verbal report.

In order to learn more about the instruction variable, we ran additional subjects under a neutral, non-Rorschach condition, where subjects were merely told to describe any visual sensations they might experience in the dark. We found that the mean number of sensations, as well as the mean scale scores for this group, fell midway between the means for the positive and negative instruction groups.

Two assistants independently scored the protocols and agreed 80% of the time on the number of reported visual sensations; and 78% of the time on scale scores.

The results of this experiment indicate that when non-psychiatric subjects are isolated in the dark for 10 minutes, they report "seeing" a variety of visual sensations. Reports of visual sensations, even when the effects of deprivation can be assumed to be very minimal, appear to be relatively normal phenomena and do not appear to be solely the result of sustained sensory deprivation.

It was shown that the type of instruction given the subjects significantly influenced the frequency and complexity of reported visual sensations. Whether the positive instructions resulted in an increase in visual sensations actually "seen," or simply in an increased readiness to report, could not be determined. In view of these results, we are inclined to take the position that, in addition to potential sensory deprivation effects, implicit or explicit sets associated with experimental conditions may markedly affect the frequency and/or complexity of the

verbal report of visual sensations. It is interesting to note that even under the most prohibitive conditions--negative instructions--the subjects reported an average of 7.7 visual sensations during the reporting period.

For the prior verbalization variable, "seeing" things on the Rorschach appeared to have no significant effect on the number or complexity of reported visual sensations. This negative finding may be of some consequence to those anticipating testing subjects prior to a deprivation experience.

In summary, then, it may be said that these findings suggest caution in ascribing reported visual sensations to the stress of sustained deprivation alone, and that attitudinal or "set" variable of instructions affected the number and complexity of reported visual sensations under conditions of minimal sensory deprivation. However, none of the visual sensations reported by the subjects used in this study had the characteristics of the hallucinatory behavior of the mentally ill; that is, there was no indication that subjects acted upon, or accepted as reality, the sense data of the visual sensations.

Table 2

Scale Scores of Ss in Each Treatment Combination

Instructions	Prior Verbalization: Non-Ror	Prior Verbalization: Ror
Pos.	N = 20 ΣX = 44 M = 2.20	N = 20 ΣX = 54 M = 2.70
Neg.	N = 20 ΣX = 30 M = 1.50	N = 20 ΣX = 37 M = 1.85

Analysis of Variance

Source of Variation	df	MS	F	P
Instruction	1	12.01	6.13	$<.025$
Prior Verbalization	1	3.61	--	
Inst. x Prior Verb.	1	.12	--	
Within cells (error)	76	1.96		
Total	79			

References

Bexton, W. H., Heron, W. & Scott, T. H. Effects of decreased variation in the sensory environment. Canad. J. Psychol., 1954, 8, 70-76.

Kandel, E. J., Myers, T. I. & Murphy, D. B. Influence of prior verbalization and instructions on visual sensations reported under conditions of reduced sensory input, Task ENDORSE, Research Note 4. Human Resources Research Office, U. S. Army Leadership Human Research Unit, Presidio of Monterey, Calif.

Lilly, J. C. Effects of physical restraint and of reduction of ordinary levels of physical stimuli on intact, healthy persons. Grp. Adv. Psychiat., Symposium No. 2, 13-20, 44. New York: 1956.

Lindquist, E. F. Design and Analysis of Experiments in Psychology and Education. Boston: Houghton Mifflin Co., 1953.

Vernon, J. A., McGill, T. E. & Gulick, W. L. Sensory deprivation. Spec. Rpt. Res. Devel. Div., Office Surgeon General, D/A, 1957.

Vernon, J., McGill, T. E. & Gulick, W. L. Sensory deprivation. Rpt. VII, Res. Devel. Div., Office Surgeon General, D/A, 1957.

Wexler, D., Mendelson, J., Leiderman, P. H. & Solomon, P. Sensory deprivation: a technique for studying psychiatric aspects of stress. No. 2 in series of 4. Naval Res. Grant 1866(29), Cambridge: Dep. Psychiat., Harvard Univer., 1957.